

REMARKS

Claims 1-10, 12 and 14-46 are pending in the application and are currently rejected. Claims 1, 12, 14-16, 18, 20-24, 26 and 39 have been amended. Claims 11 and 13 have been cancelled. In light of the amendments and remarks herein, reconsideration of claims 1-10, 12 and 14-46 is respectfully requested.

Amendments to the Claims

While Applicants believe that the previously presented claims are patentable over all of the art cited in the Office Action as well as all other references submitted by Applicants, the claims have nonetheless been amended as follows in order to expedite allowance of the claims. The amendments are therefore made without prejudice or disclaimer, and Applicants reserve the right to pursue the original scope of the claims as provided prior to the cancellation or amendments, such as through continuation practice.

Claim 1 is amended to recite an apparatus having one or more bristles optically coupled to the at least one radiation emitter to receive and propagate the phototherapeutic radiation therefrom. The additional elements are similar in scope to those previously cited in now-cancelled claims 11 and 13.

Claims 12, 14-16, 18 and 20-23 are amended to change the dependency from a now-cancelled claim.

Claim 14 is further amended to correct a typographical error objected to by the Examiner.

Claim 22 is further amended to clarify that the bristles may be coupled to less than all of the radiation emitters.

Claim 24 is amended to rewrite the claim in independent form, including all of the limitations of the base claim and any intervening claims.

Claim 26 is amended to correct a grammatical error.

Claim 39 is amended to correct a typographical error objected to by the Examiner.

As such, the amendments to claims 1, 12, 14-16, 18, 20-24, 26 and 39 do not add any new matter.

Double Patenting

The Applicants gratefully acknowledge the Examiner's decision to tentatively withdraw the provisional obviousness-type double patenting rejections.

Claim Rejections - 35 U.S.C. § 102

Claims 1, 5 and 6

Claims 1, 5 and 6 stand rejected under 35 U.S.C. §102(b) as being anticipated by U.S. 2001/0024777 to Azar et al. (herein "Azar"). These claims are novel, however, because Azar fails to disclose all of the elements recited in the claims. For example, Claim 1 recites "at least one radiation emitter coupled to the body to irradiate a portion of the oral cavity with phototherapeutic radiation in at least two separate spectral bands." Azar does not teach a device with a radiation emitter coupled to the body to irradiate a portion of the oral cavity with phototherapeutic radiation in at least two separate spectral bands.

The Examiner references paragraph 41 of Azar to infer that Azar discloses a device that emits radiation in at least two separate spectral bands. However, that inference cannot be drawn from the passage. Specifically, the passage states that a pulse of light is modified to produce at least one band-limited light pulse. (See Azar ¶43) There is no reference to multiple bands in the passage. The reference to "at least one" in the passage appears to refer to the number of pulses, and not to the number of spectral bands. This is further demonstrated by the use of the term "at least one" to refer to the original unmodified pulse prior to the formation of the band. (See Azar ¶42.) In other words, the "at least one" unmodified pulse is band limited to form "at least one" modified pulse – not "at least one" spectral band.

Azar does not demonstrate any need or benefit to multiple spectral bands, because Azar essentially teaches the use of a spectral band that is outside that of the absorption bands of

oxyhemoglobin. For example, in paragraph 81, Azar refers to a single band between 450-500 nm for this purpose.

Filters 21 and 23 filter the broad band light produced by the xenon lamp to produce incoherent light which is band limited with a bandwidth of approximately 50 nm including the approximate wavelength range of 450-500 nm. This band of wavelengths is outside the absorption bands of oxyhemoglobin and within the main absorption band of the stain.

Claims 5 and 6 are novel for at least the same reasons that Claim 1 is novel. Accordingly Claims 1, 5 and 6 are patentable over Azar.

Claims 1, 11-14, 16, 18 and 22

Claims 1, 11-14, 16, 18 and 22 stand rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent 6,094,767 to Iimura (herein "Iimura"). These claims are novel, however, because Iimura fails to disclose all of the elements recited in the claims. For example, Claim 1 recites "at least one radiation emitter coupled to the body to irradiate a portion of the oral cavity with phototherapeutic radiation in at least two separate spectral bands."

Iimura does not teach such a device. Instead, Iimura discloses the use of "short wave light rays to activate [a] photocatalyst." (See Iimura Abstract.) Iimura does not disclose the use of two separate spectral bands of phototherapeutic radiation to activate a photocatalyst or for any other purpose. More specifically, Iimura discloses the use of ultraviolet radiation to accomplish this purpose.

In the passage referred to in the Office Action (Iimura col. 5, lines 24-26), the use of phototherapeutic radiation in at least two spectral bands is not disclosed. There, Iimura refers only to the use of a UV radiated fluorescent lamp that "emits blue color light rays and also UV light rays with medium and long wavelength." The disclosure does not state that these are multiple spectra of phototherapeutic radiation. There is no disclosure that the emission of the UV lamp is two distinct bands -- one UV and one blue -- as opposed to one continuous spectrum from UV to blue.

Furthermore, Iimura does not disclose that the blue light is phototherapeutic radiation. In fact, Iimura appears to teach the opposite. In the preceding paragraph (Iimura col. 5, lines 16-22), Iimura actually discloses that the blue light can be filtered out (i.e, using a “UV transmissible black filter glass tube to cut only the blue color light rays”). Beyond the reference to potential light sources in column 5, Iimura contains no further reference to blue light. Thus, Iimura does not disclose blue light as a separate spectral band of phototherapeutic radiation.

Claims 11-14, 16, 18 and 22 are novel for at least the same reasons that Claim 1 is novel. Accordingly Claims 1, 11-14, 16, 18 and 22 are patentable over Iimura.

Claims 1, 27 and 29

Claims 1, 27 and 29 stand rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent 6,331,111 to Cao (herein “Cao”). These claims are novel, however, because Cao fails to disclose all of the elements recited in the claims. For example, Claim 1 recites “one or more bristles optically coupled to the at least one radiation emitter to receive and propagate the phototherapeutic radiation therefrom.”

Cao does not teach such an oral device having bristles optically coupled to an emitter. Cao instead discloses a “curing light system useful for curing light activated composite materials.” (See Cao Abstract.) Cao does not disclose a device having one or more bristles optically coupled to the at least one emitter” as claimed in currently-amended claim 1. Cao does not disclose a device having any bristles.

Claims 27 and 29 are novel for at least the same reasons that Claim 1 is novel. Accordingly Claims 1, 27 and 29 are patentable over Cao.

Claims 1-10, 26, 31-42, 45 and 46

Claims 1-10, 26, 31-42, 45 and 46 stand rejected under 35 U.S.C. §102(b) as being anticipated by WO 98/06456 to Chen et al. (herein “Chen”). These claims are novel, however, because Chen fails to disclose all of the elements recited in the claims. For example, Claim 1 recites “one or more bristles optically coupled to the at least one radiation emitter to receive and

propagate the phototherapeutic radiation therefrom.” Chen does not teach such an oral device having bristles optically coupled to an emitter.

With respect to multiple spectral bands, the Examiner states that U.S. Patent 5,445,608 (the “‘608 patent”), which is incorporated by reference in Chen, supplies the missing element of an oral device having at least one radiation emitter to irradiate phototherapeutic radiation in at least two spectral bands. The ‘608 patent discloses an invasive probe for treating, e.g., tumors, that may operate “at two or more wavelengths.” (‘608 Patent Cols. 1:15-36, 8:37-45 and Abstract.) However, Chen expressly discloses a device that operates differently than the probe and teaches away from combining the features of the probe and oral appliance. Chen states that “the design and shapes of probes disclosed in [the ‘608 patent] are not well suited for use in administering PDT for extended periods of time inside a patient’s mouth.” (Chen page 2 lines 28-30.)

Further, by incorporating the ‘608 patent by reference, Chen discloses a probe that is capable of operating using multiple wavelengths, but has not disclosed an oral appliance having such capability. Additionally, neither device discloses the bristles as recited in currently-amended claim 1. Thus, Chen fails to disclose a device that anticipates the claimed invention due to the lack of an express disclosure, a motivation to combine the aspects of the disclosed probe and aspects of the disclosed mouthpiece to obtain the claimed features of the claimed invention, and the express teaching that the probe is ill-suited for use in the oral cavity.

Additionally, Chen expressly and repeatedly discloses operation of an oral appliance at only a single waveband. Chen teaches the application of a photoreactive agent and the illumination of the agent after it is absorbed into tissue in the oral cavity. For example, Chen discloses the application of a photoreactive agent that has a characteristic waveband of wavelengths that are absorbed and that is placed along the gum line and illuminated with “light having a corresponding waveband.” (Chen page 7, lines 2-5.) Chen does not disclose the operation of an oral appliance using multiple wavebands. The limitation of Chen’s device to operation using a single waveband is also clearly reflected in the claims. For example, all but one of the amended claims in Chen require “a predefined waveband that is substantially equal to

a characteristic light absorption waveband of a photoreactive agent” and all of the claims require “a predefined waveband.” (See Chen Independent Claims 1, 7, 12, 17, 18, 19 and 20).

Consistent with Chen’s specification, no claim recites multiple wavebands.

Furthermore, as noted above, Chen discloses only the illumination of photoreactive agents, and does not disclose a device as claimed in the present Application, which is capable not only of illuminating and treating tissue using multiple spectral bands but also of treating tissue without the use of a photoreactive agent. (See Application generally.)

Claims 2-10, 26, 31-42, 45 and 46 are novel for at least the same reasons that Claim 1 is novel. Accordingly Claims 1-10, 26, 31-42, 45 and 46 are patentable over Chen.

Claims 1 and 43-44

Claims 1 and 43-44 stand rejected under 35 U.S.C. §102(e) as being anticipated by U.S. Patent 6,443,978 to Zharov (herein “Zharov”). These claims are novel, however, because Zharov fails to disclose all of the elements recited in the claims. For example, Claim 1 recites “one or more bristles optically coupled to the at least one radiation emitter to receive and propagate the phototherapeutic radiation therefrom.” Zharov does not teach such an oral device having bristles optically coupled to an emitter.

Zharov instead discloses a “physiotherapeutic irradiation of spatially extensive pathologies” using “sources of optical radiation ... placed on the surface of a substrate....” (See Zharov Abstract.) Zharov does not disclose a device having one or more bristles optically coupled to the at least one emitter as claimed in currently-amended claim 1. Zharov does not disclose a device having any bristles.

Claims 43 and 44 are novel for at least the same reasons that Claim 1 is novel. Accordingly Claims 1 and 43-44 are patentable over Zharov.

Claim Rejections - 35 U.S.C. § 103

Claim 15

Claim 15 stands rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent 6,094,767 to Iimura (herein "Iimura") in view of U.S. Patent 6,239,442 to Iimura (herein "Iimura '442").

As discussed above, Iimura does not disclose all elements of Claim 1 from which Claim 15 depends. Iimura '442 provides nearly the same disclosure as Iimura. Thus, Claim 15 is not obvious, because all elements of the claim are not disclosed in the combination of Iimura in view of Iimura '442.

Claim 21

Claim 21 stands rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent 6,094,767 to Iimura (herein "Iimura") in view of U.S. Patent 6,862,771 to Muller (herein "Muller").

Claim 21 is not obvious, because there is no motivation to combine Iimura and Muller. The teaching of each is different in scope. Iimura discloses a cleaning device that is said to be broadly applicable to various cleaning devices, including vacuum cleaners and mops. Though Iimura does disclose embodiments related to dental devices, the stated purpose is different than that of Muller. Muller is directed to "a toothbrush head suitable to direct incident radiation toward a surface of a tooth and to collect emitted radiation from the surface of the tooth." (See Muller, Abstract.) There is no explicit or implicit teaching in either reference that would lead one skilled in the art to combine the references.

Claim 23

Claim 23 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Iimura in view of U.S. Patent 6,273,884 to Altshuler et al. (herein "Altshuler").

Claim 23 is not obvious, because there is no motivation to combine Iimura and Altshuler. Iimura does not disclose a need or benefit from controlling the emission of radiation when a bristle is not in contact with tissue of the oral cavity. Instead, Iimura discloses a means to irradiate a photocatalyst, which can be applied to cleaning heads generally, including vacuums and mops. While Iimura does teach at least one embodiment that employs the concept of total internal reflection, it is concerned with using total internal reflection to ensure that radiation travels along, e.g., a fiber optic cable. (See Iimura col. 2, lines 47-53.) There is no teaching of a benefit or need to restrain that radiation once it has been properly delivered to the terminal end of the optical path – whether that path is located in a vacuum, a mop or an oral device. As such, there is no teaching that would lead one to combine Altshuler's total internal reflection mechanism with Iimura's oral device, just as there is no teaching that would motivate one skilled in the art to combine Altshuler with Iimura's mop.

Claim 25

Claim 25 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Iimura in view of U.S. Patent No. 5,133,102 to Sakuma (herein "Sakuma"). The claims, however, are patentable, because even when combined Iimura and Sakuma do not provide all of the elements of the claims.

As discussed above, Iimura does not disclose all of the elements of independent Claim 1, and Sakuma does not supply the teachings that are missing from the claims.

Additionally, Sakuma does not teach a contact sensor and controller that controls the radiation emitter based on signals from the contact sensor as recited in Claim 25. Sakuma teaches a simple circuit that is closed by the gripping of the handle of the toothbrush and the touching of the bristles to the teeth. The complete circuit causes "a current which passes through the user's hand and body flows into the surface of the teeth via the dental pulp tissue and tooth tissue proper." (See Sakuma Col. 4, lines 4-9.) The "flow of electric current causes the protein organic ions of plaque on the surfaces of the teeth to become affixed to the toothbrush." (See Sakuma Col. 4, lines 4-9.) The mechanism in Sakuma is not a contact sensor that supplies signals to a controller that controls the emitter. Sakuma does not emit radiation onto the teeth

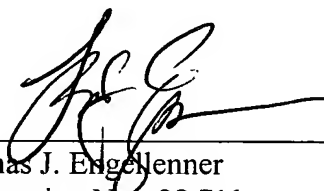
and, thus, does not include a controller that controls the emitter. Instead, the LED of Sakuma is an alarm to alert the user "that the toothbrush is operating." (See Sakuma, Abstract.)

CONCLUSION

In summary, the above-identified patent application has been amended and reconsideration is respectfully requested for all the reasons set forth above. In the event that the Examiner deems that the amendments and remarks do not overcome the stated grounds for rejection, the Applicants kindly request that the Examiner telephone the undersigned representative to discuss any remaining issues.

Respectfully submitted,

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